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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte 3D SYSTEMS, INC.

Appeal 2007-3397
Application 10/644,299
Technology Center 1700

Decided: September 12, 2007

Before RICHARD E. SCHAFER, RICHARD TORCZON, and JAMES T.
MOORE, *Administrative Patent Judges*.

TORCZON, *Administrative Patent Judge*.

DECISION ON APPEAL

The claims on appeal are broadly directed to processes for making three-dimensional articles from radiation-curable resins using stereolithography. The appellant (3D Systems) seeks review of rejections of its pending claims. We affirm.

CLAIMS

Claims on appeal

What claims are on appeal? At the close of prosecution there were forty-two claims, of which claims 1-21 stood rejected and the others were withdrawn from consideration.¹ The appeal brief indicates that claims 1-21 are on appeal.² In his answer, the examiner indicates at one point that three rejections of claim 21 are withdrawn, but elsewhere maintains two rejections against claim 21 (including one previously said to have been withdrawn).³ The reply indicates that an amendment has been filed canceling claim 21 and rewriting other claims.⁴ We have no indication in the record on appeal that these late amendments were entered. Indeed, we have exercised our discretion to look at the prosecution record from which it appears that the amendment was not entered.⁵ Examiners have limited discretion to enter an amendment filed with or after the appeal brief.⁶ In the present case, the examiner determined that the limited reasons for accepting a late amendment were not met.⁷

This appeal was docketed on 11 July 2007. It appears from the prosecution record that yet another late amendment was filed after the docketing date. The Board had acquired jurisdiction over the appeal by the

¹ Office Action Summary 1 (15 February 2006) (Final Rejection).

² E.g., Appeal Brief (Br.) 24-27 (Claims Appendix).

³ Examiner's Answer (Ans.) 3-4.

⁴ Reply 2.

⁵ Advisory Action 1 (7 June 2007).

⁶ 37 C.F.R. § 41.33(b).

⁷ Advisory Action 1, item 4.

time the docketing notice issued.⁸ Thus, the second late amendment was too late for the examiner to consider and, in any case, appears to suffer some of the same formal defects as the previous amendment. In sum, we proceed with the claims as they stood when the appeal brief was filed. All of the claim language cited in this opinion comes from the claims appendix to the appeal brief.

Claim construction

Claims 1-21 are pending for the purposes of appeal. We need only consider the claims separately argued and may select a claim to represent the unargued claims, which stand or fall with it.⁹ Even for the claims argued separately, we focus on the contested limitations.¹⁰ For each rejection, 3D Systems offers separate arguments for claims 1 and 21. For the rejection over the Haruta publication,¹¹ 3D Systems also cites differences for claims 18-20.¹²

Claim 1 defines the invention as follows—

1. A process for forming a three-dimensional article by stereolithography, said process comprising the steps:
 - (a) coating a thin layer of a liquid radiation-curable composition onto a surface said composition including at least one filler comprising silica-type nano-particles suspended in the radiation-curable composition[;]

⁸ 37 C.F.R. § 41.35.

⁹ 37 C.F.R. § 41.37(c)(1)(vii).

¹⁰ *E.g., Vivid Tech., Inc. v. Am. Sci. & Eng'g., Inc.*, 200 F.3d 795, 803, 53 USPQ2d 1289, 1294 (Fed. Cir. 1999).

¹¹ Yuichi Haruta et al., *Resin composition and mold made from such resin, for forming fibrous material*, EP 0 830 928 B1 (pub'd 26 June 2002) (Haruta).

¹² Br. 11.

(b) exposing said thin layer imagewise to actinic radiation to form an imaged cross-section, wherein the radiation is of sufficient intensity to cause substantial curing of the thin layer in the exposed areas;

(c) coating a thin layer of the composition onto the previously exposed imaged cross-section;

(d) exposing said thin layer from step (c) imagewise to actinic radiation to form an additional imaged cross-section, wherein the radiation is of sufficient intensity to cause substantial curing of the thin layer in the exposed areas and to cause adhesion to the previously exposed imaged cross-section;

(e) repeating steps (c) and (d) a sufficient number of times in order to build up the three-dimensional article.

We select claim 1 as representative of the other claims to the extent they are not separately argued. We are obligated to give a claim the broadest construction that those in the art would give the claim in view of the specification.

Claim 1 requires a filler with silica-type nanoparticles. The specification defines "silica-type nanoparticles" as—¹³

silica-containing particles having an average particle size in the range of about 10 to about 999 nm, preferably from about 10 to about 50 nanometers, as measured by light scattering methods, such as by the small angle neutron scattering method.

The use of "about" in defining the range of particle sizes expands the range of acceptable particles a bit beyond the explicit numerical values stated. Thus, we conclude that the upper range of nanoparticle sizes includes sizes slightly larger than 999 nm, including 1000 nm. In its brief, 3D Systems

¹³ Specification (Spec.) 6:12-20.

recites advantages of nanoparticles versus micron-sized particles, but does not show where these advantages are reflected in claim 1.¹⁴

THE REJECTIONS

What rejections are pending? Again, the record is confused. The final rejection contains four bases of unpatentability.¹⁵ Claims 1-10 and 12-21 stood rejected as having been anticipated¹⁶ by the Haruta publication and also by a published application of Watanabe.¹⁷ Claims 1-21 stood rejected as anticipated by a published application of Napadensky¹⁸ and also as directed to subject matter that would have been obvious¹⁹ in view of the Napadensky publication. On appeal, the examiner inconsistently states that the rejections of claim 21 over Watanabe and Napadensky are withdrawn,²⁰ but later indicates that the obviousness rejection over Napadensky still stands.²¹ The reply brief of 3D Systems furthers the confusion by interpreting the Examiner's Answer as having withdrawn the rejection over Haruta as well as all rejections of claim 21, which 3D Systems believes it

¹⁴ Br. 10.

¹⁵ Final Rejection 3-4.

¹⁶ 35 U.S.C. 102.1

¹⁷ Tsuyoshi Watanabe et al., *Photo-curable resin compositions and process for preparing a resin-based mold*, EP 0 831 373 A2 (pub'd 25 March 1998) (Watanabe).

¹⁸ Eduardo Napadensky et al., *Compositions and methods for use in three dimensional model printing*, US 2003/0207959 A1 (pub'd 6 November 2003).

¹⁹ 35 U.S.C. 103.

²⁰ Ans. 3.

²¹ Ans. 7.

has canceled.²² Although the reply brief requested clarification from the examiner regarding this interpretation, no such clarification was provided.

In the face of this confusion, we note that the rejection under review is the final rejection, not the examiner's answer.²³ While settlement of disputes is generally welcome, we cannot assume a contested issue has been resolved in the face of equivocal evidence.

The examiner did not withdraw the rejection over Haruta. The paragraph in the answer that triggers the confusion²⁴ does not purport to list the rejections still pending, but rather attempts to list points of departure from what 3D Systems said the rejections were. The positive statement of the rejections in the answer is consistent with those in the final rejection except that the anticipation rejections of claim 21 in view of Watanabe and Napadensky appear to have been withdrawn.²⁵ We decide the appeal on the basis of this understanding. There is no prejudice to 3D Systems, which addressed all of the rejections made in the final rejection (i.e., before the examiner's answer) and which offers no additional substantive argument in its reply.

Anticipation by Haruta

The examiner points to paragraphs 0011-0016 and 0031-0084 of Haruta as providing evidence of the anticipation of claims 1-10 and 12-21 under § 102(b). Several elements are missing, however, according to 3D Systems.

²² Reply Brief (Reply) 3.

²³ 35 U.S.C. 134(a).

²⁴ Ans. 3.

²⁵ Ans. 4-7.

Claim 1 requires a filler with silica-type nanoparticles. Haruta teaches a filler comprising silica powder "with an average particle size or fiber length of 1 to 50 μm ".²⁶ We take notice that 1 μm is 1000 nm. Moreover, "average size" implies that some particles will be smaller than 1 μm . Given the very broad definition of "nanoparticle" in the specification (with an upper range of "about 999 nm"), those in the art would have understood Haruta to teach this limitation. Since claim 1 is not limited to 3D System's preferred size, we find no merit to its contention that Haruta teaches the use of "significantly larger" particles than those claimed.²⁷

Claim 18 requires "at least one hydroxyl-functional compound". Haruta teaches the use of 2,6-di-*t*-butyl-4-methyl phenol as an optional additive.²⁸ We note that this phenol has a hydroxyl moiety. We find that those in the art would have understood Haruta to teach the use of a hydroxyl-functional compound as an optional additive.

Claim 19 requires the hydroxyl-functional compound to be trimethylol propane. The examiner has not pointed to any specific support for this limitation. We find none.²⁹

Claim 20 requires the hydroxyl-functional compound to constitute "about 1% to about 10% by weight of the total liquid radiation-curable composition". The examiner has not pointed to any specific support for this limitation. We find none.

²⁶ Haruta 0061-0062.

²⁷ Br. 10.

²⁸ Haruta 0075.

²⁹ While "trimethylol propane" appears many times in Haruta, it is used to describe ethers or esters, not a triol.

Claim 21 requires at least one filler comprising silica nanoparticles and also at least one microparticle filler. As discussed above, Haruta teaches the use of particles with an average size of 1 to 50 μm . Moreover, Haruta teaches the use of more than one silica particle type.³⁰ Since Haruta teaches particles of more than one silica type in a size range spanning from the upper end of the nanometer range into the lower micron range, we find those in the art would have understood Haruta to teach this limitation.

The anticipation rejection over Haruta is affirmed for claims 1, 18, and 21, as well as for claim 2-10 and 12-17, which were not separately argued, but reversed for claims 19 and 20.

Anticipation by Watanabe

The examiner points to all of Watanabe, but particularly pages 3-10 as providing evidence of the anticipation of claims 1-10 and 12-20 under § 102(b). A limitation of claim 1 is missing, however, according to 3D Systems. No other limitation or claim is argued for this rejection.

Claim 1 requires a filler with silica-type nanoparticles. Watanabe, like Haruta, teaches the use of a filler with silica particles with an average diameter of preferably 1-50 μm .³¹ Those in the art would have understood Watanabe to teach this limitation for the same reasons given for Haruta.

The anticipation rejection over Watanabe is affirmed for claim 1, as well as for claims 2-10 and 12-20, which were not separately argued.

³⁰ Haruta 0063: "A filler, such as fused *and/or* crystal silica, of which the powder particles are spherical (0.9 or greater sphericity, for example) is especially preferred" (emphasis added).

³¹ Watanabe 7:11-12 and 42. The Haruta and Watanabe disclosures are very similar and appear to have the same inventors.

Although the examiner appears to have withdrawn the rejection of claim 21 over Watanabe, the only limitations (silica nanoparticles and microparticle filler) argued for this claim are present in Watanabe for the same reasons given for Haruta. Since a rejection of claim 21 has already been affirmed, we do not enter a new ground of rejection here.

Anticipation by Napadensky

The examiner relies on all of Napadensky, but particularly paragraphs 0010 and 0126-0130, as evidence of the anticipation of claims 1-20 under § 102(e). According to 3D Systems, the claims are not anticipated. Claim 21, the only claim for which separate arguments were provided, no longer stands rejected on this ground.

Claim 1 defines the invention as a stereolithography process. Napadensky "relates to three-dimensional object building in general and to methods of and compositions for use in three-dimensional printing of complex structures in particular."³² While 3D Systems characterizes Napadensky as limited to three-dimensional printing, Napadensky does not consider itself to be so limited. Significantly, the portions of Napadensky to which 3D Systems points³³ are different from the portions on which the examiner relies.

In paragraph 0010, Napadensky discusses "[r]adiation curable compositions for stereolithography", but concludes that existing compounds

³² Napadensky 0002.

³³ Br. 14, citing Napadensky 0014, 0036-0037, 0057, 0074, 0076-0079, 0092, and 0094.

in the art are too complex and expensive, which leads to the conclusion in paragraph 0011:

Thus, there is a need for simple, easily obtainable curable compositions, that are specially formulated to construct a three-dimensional object. There is further a need for simple, easily obtainable curable compositions, that are specially formulated to provide support to a three-dimensional object, by forming support/and or release layers around the object during its construction. Lastly, there is a need for methods of constructing a three-dimensional object by using the above mentioned compositions.

A reference is good for all it teaches. We find that those in the art would have understood Napadensky to be directed to compositions and processes for use in stereolithography.

No other error, limitation, or claim is argued (except claim 21, which is now moot). We affirm the anticipation rejection over Napadensky for claim 1, as well as claims 2-20, which were not argued separately.

Obviousness in view of Napadensky

At least one anticipation rejection has been affirmed for each claim subject to this rejection. Consequently, we do not reach the obviousness rejection.

HOLDING

The rejection of claims 1-10, 12-18, and 21 as anticipated by Haruta is affirmed, but not the rejection of claims 19 and 20.

The rejection of claims 1-10 and 12-20 as anticipated by Watanabe is affirmed.

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The rejection of claims 1-20 as anticipated by Napadensky is affirmed.

The rejection of claims 1-21 as having subject matter that was obvious in view of Napadensky is dismissed as moot.

In summary, at least one anticipation rejection for each of claims 1-21 is—

AFFIRMED

LP

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